

LAND SHELLS OF THE GENUS *ENA* TURTON FROM SWAGNI MAIDAN, PARBATTI VALLEY, PUNJAB, WITH DESCRIPTION OF A NEW SPECIES (MOLLUSCA, GASTROPODA : FAMILY ENIDAE)

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PLATES II, III.

INTRODUCTION.

In July, 1949, Dr. G. S. Puri, Ecologist, Forest Research Institute and College, Dehra Dun, sent for determination one lot of dry shells to the Director, Zoological Survey of India, with the following interesting remarks relating to the ecological conditions which he himself studied at the time of collecting the specimens :—

“I have collected these specimens of freshwater shells from a moraine (perhaps, of sub-recent age) at an altitude of 10,000 ft., at Swagni Maidan in Pulga in the Parbatti Valley. The soil was deep clayey, brownish in colour and the specimens were found embedded (0.2" depth) in the clay.”

Again, “snow line is just a few hundred feet (perhaps, 300 or so) above the place where these specimens were collected and snow water flows to this place in summer. During winter Swagni Maidan remains under water, and it is probable that glaciers must have descended to this level during the past. The glaciation in the valley may be of Pleistocene and also post-Pleistocene age. In some neighbouring valleys glaciers slip down the precipitous slopes even at the present time and such phenomenon is quite common. As a matter of fact, throughout the length and breadth of the Maidan these shells were found”.

He has also been good enough to send me two very beautiful photographs which give a clear idea about the topography of the place wherefrom the specimens were collected. I am reproducing these photographs in Plate III (Figs. 1, 2). In this connection he also wanted to know if there was any lacustrine conditions prevailing at Swagni Maidan at the time of the occurrence of the shells. But after carefully examining the shells I found that they represent the true land snails of the genus *Ena* Turton, not freshwater ones as assumed by Dr. Puri. So, this may possibly lead one to think that there were no lacustrine conditions prevailing at Swagni Maidan at the time of the occurrence of the shells, and that the flow of snow water in the place from the snow line lying just a few feet above, as pointed out by Dr. Puri, might be responsible for making the soil clayey. The matter was referred to Dr. P. K. Ghose, Palaeontologist, Geological Survey of India, Indian Museum, Calcutta, for opinion, who also arrived at the same conclusion.

When the specimens were further examined more critically, all of them (excepting one which I suspected to be a new form of *Ena* from a study of the characters displayed by its shell) appeared to show certain features in their shell-characters somewhat closely resembling those of the species *E. domina* on the one hand and *E. arcuata* on the other (though tending more towards the latter in essential details). But since our entire named collections of that family were very badly damaged by the Varuna flood of 1943 at Banaras and, as such, no reliable specimens of

the group were available here for comparison, I felt a bit confused as to the exact identity of the shells in question. So, I sent them all (including that interesting solitary specimen marked as 2*b* and the rest as 2*a*) to Dr. W. J. Rees of the British Museum (Nat. Hist.), London, for his expert opinion. The latter has kindly favoured me with the following reply:—

No. 2*a*. "*Ena arcuata* Hutton—compares well with specimens from Calcutta, N. W. India and Mahosu in the B. M. Collection".

No. 2*b*. "*Ena* (sp. ?)—this appears to be a distinct species of which specimens are not available here for comparison. The nearest approach is *Ena vibex* Hutton but the striations are far more prominent than in your specimen".

It is quite clear from the above remarks that the peculiarities I noticed in the solitary shell (No. 2*b*) have been approved by the expert in the British Museum and, as such, may warrant a separate specific rank for the latter, while the rest of the specimens (No. 2*a*) may easily be referred to the species *E. arcuata*. So, I consider it a great pleasure to designate the new species as *Ena purii* after Dr. G. S. Puri who collected the specimens.

Family ENIDAE.

Sub-family ENINAE.

Ena arcuata (Hutton).

(Pl. II, Figs. 1-12.)

A detailed discussion about the nomenclature of this interesting species is made by Reeve¹, while a good account of its systematic position, salient features and geographical distribution is given by Gude². But there are two very interesting points which may be worth-mentioning here. That is, firstly, Swagni Maidan appears to be a new record; secondly, the measurements taken show that the largest shell (fig. 12) in the series of 45 specimens (excluding the two new ones) is 21 mm. in length and 8 mm. in diameter (with its aperture 7.5 mm. × 6 mm.) which certainly exceeds the previous record of 18 mm. × 7.5 mm. known in case of a shell from Mukraj, Salt Range, Punjab. The smallest shell (fig. 1) is 12.5 mm. in length and 5 mm. in diameter (with its aperture 5 mm. × 4 mm.). It also appears true from the observations made on these shells and the facts on record that if the length of a shell is found to be maximum in the series, its diameter may not also be so. Similar appears to be the case regarding the length and diameter of the aperture too. Out of 45 shells, I have taken photographs of only 12 showing the range of variations in shape and size as well as in other characters.

Locality.—Swagni Maidan (alt. 10,000 ft.), gently sloping meadow—originally a moraine—without tree growth, in Pulga in the Parbatti Valley, Kulu Sub-division, Punjab.

Specimens.—Reg. No. M $\frac{16062}{2}$ Zoological Survey of India.

¹ Reeve, L. *Conch. Icon.* V, pl. lxxvii, sp. 478 (1849).

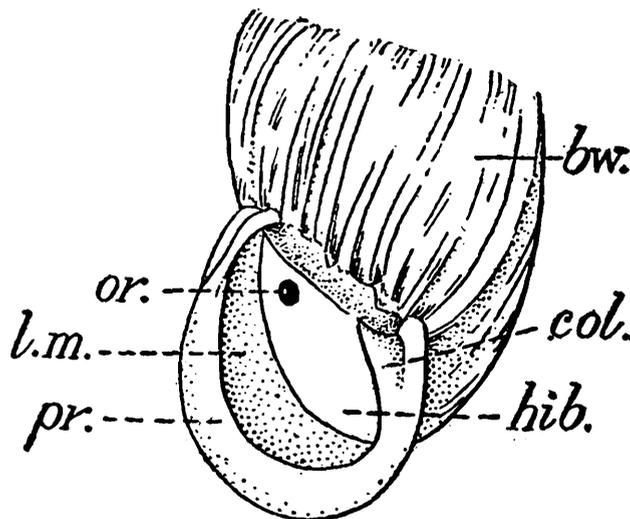
² Gude, G. K., *Faun. Brit. Ind. Mollusca*, II, pp. 239, 240, fig. 89 (1914).

***Ena purii*, sp. nov.**

(Pl. II, Figs. 13, 14.)

At first I found only one large shell (fig. 13) of this remarkable species in the collection mixed up with those of *E. arcuata*, which appeared quite unique in the series. But later on another young specimen was also found in the lot showing similar structural peculiarities. A detailed description of this new species is given below :—

Shell small, sinistral, ovato-cylindrically turreted, somewhat resembling *E. vibex* in appearance, umbilicated, uniformly covered with a very thin, chalky-white coating on the last four whorls, which more or less conceals the original horny-brown colour visible only on the uppermost whorls, apex obtuse ; whorls $8\frac{1}{2}$, regularly increasing, convex, each one adorned on the surface with numerous distinct longitudinal plications (all of which may not be equal in size or regularly arranged) giving it a corrugated tin-like appearance somewhat-like that of *E. nevilleiana* (Theobald), the plications gradually becoming more prominent from above downwards ; sutures more impressed and oblique ; aperture



TEXT FIG. 1. Ventral view of the shell of *Ena purii*, sp. nov. showing the hibernaculum *in situ*. X6.

hib. hibernaculum ; *bw.* bodywhorl ; *col.* columella ; *l. m.* lumen of the mouth of shell ; *pr.* peristome ; *or.* orifice.

oblong-ovate somewhat-like that of *E. arcuata*, interior pale brownish, edentate ; peristome (Text-fig. I, *pr.*) broad, reflected as in *E. arcuata*, but not united upwards with the columella (*col.*) which is dilated, slanting and curved (at the place where it unites with upper lip) like that of the latter. The beautiful colour streaks on the surface, so characteristic of *E. arcuata*, *E. vibex* and others, are entirely lacking in this case.

In the young shell (fig. 14) there are only 7 whorls with a similar chalky-white coating on the last four, but the plications appear quite indistinct or obsolete on the first two. The peristome is very thin and not reflected, while the columella is less dilated and somewhat straight, but more angular below. The bodywhorl appears more convex.

To my utter surprise, I found on a closer examination of the large shell the presence of a thin, opaque, calcareous plate, called hibernaculum (see Text-fig. I. *hib.*) or epiphragm, within the lumen of its mouth (l. m.). Such a remarkable structure can only be found in case of the inoperculate and aestivating land snails, which enables the animals to tide over the most unfavourable climatic conditions, such as, extreme heat or cold, when they retreat themselves within the shells, lie there in a condition of torpor or comatose by closing the aperture with the epiphragm and saving with great difficulty only the skin and flesh on stored up food during this prison life. So, it is quite evident that the animal which occupied the shell in question certainly passed through such a hard and difficult time before it died. It is known from the note given by Dr. Puri that the shells of this new species as well as those of *E. arcuata* were collected on 29th May, 1949. But unless the living specimens can be collected in the field and treated carefully in order to see when they actually come out of the shells after the comatose condition by tearing off the epiphragm, it is difficult to ascertain (simply by examining the dead shells) the exact time, either summer or winter, which urge the snails to form this peculiar structure as a measure of protection. The same difficulty arises in the present case also. But it is true that the animal died before it could release itself from its summer or winter sleep.

The hibernaculum is oblong-ovate, quite complete, somewhat convex externally, and occupies the extreme lower part of the lumen of the mouth within the bodywhorl. Its position indicates that it may correspond to the last one of the series of three or more such plates (situated at close or short intervals) as described and figured by Annandale and Rao (1925)¹, Hora (1927)² and Rao (1927)³ in case of some land snails, namely, *Zootecus insularis* (Ehr.) from the Salt Range, Punjab, *Macrochlamys glauca* Benson from the Kangra Valley, Western Himalayas, and *Glessula (Rishetia) hastula* Benson from Pashok (Eastern Himalayas) in the Darjeeling District, Northern Bengal. The lower portion of the hibernaculum is somewhat angular, but the upper portion is more produced towards the upper extremity like a cone and forms an acute angle there. Slightly below this cone-shaped extremity is found a distinct circular orifice (*or*) which the animal possibly used for the purpose of respiration during the period of aestivation.

Measurements.—The large shell measures 15 mm. in length and 5.5 mm. in diameter with its aperture 5 mm. × 4 mm., while the young one measures 9 mm. in length and 4 mm. in diameter with its aperture 3.5 mm. × 2.5 mm.

Type-locality.—Swagni Maidan (alt. 10,000 ft.), a gently sloping meadow—originally a moraine—without tree growth, in Pulga in the Parbatti Valley, Kulu Sub-division, Punjab.

Holotype.—Reg. No. M $\frac{16063}{2}$ Zoological Survey of India.

Paratype.—Reg. No. M $\frac{16064}{2}$ Zoological Survey of India.

¹ Annandale, N. and Rao, H. S., *Rec. Ind. Mus.*, XXV, pp. 394, 395 (1925).

² Hora, S. L., *Rec. Ind. Mus.*, XXIX, pp. 56-62 (1927).

³ Rao, H. S., *Rec. Ind. Mus.*, *ibid.*, pp. 50-56 (1927).

Remarks.—In the general appearance of its shell, the new species, *Ena purii*, somewhat approaches *Ena vibex*, but differs from it markedly in having distinct longitudinal plications (instead of striations) on the surface, more impressed and oblique sutures. It also shows some resemblance to *E. arcuata* regarding the shape of its aperture and also in the character of the inner and outer lips. Moreover, the nature of rugation or plication on the surface approximates nearly to *E. nevilliana*.

I am greatly indebted to Dr. W. J. Rees of the British Museum (Nat. Hist.), London, for the care and interest with which he has examined the specimens and also for the opinions freely bestowed. My grateful thanks are due to Dr. G. S. Puri, Forest Research Institute and College, Dehra Dun, who kindly supplied me all the necessary information wanted with great promptitude together with two very beautiful photographs.